



Full length article

Are we addicted to our cell phones?



M. Sapacz*, G. Rockman, J. Clark

University of Winnipeg, Department of Psychology, Winnipeg, Manitoba, Canada

ARTICLE INFO

Article history:

Received 28 August 2015

Received in revised form

15 November 2015

Accepted 1 December 2015

Available online 24 December 2015

Keywords:

Anxiety

Cell phones

Addiction

Social connectedness

ABSTRACT

Cellular telephone use has become extremely widespread over the past several years. There has been concern that current high levels of cell phone use may be compared to a behavioral addiction. However, this has yet to be thoroughly tested. This area of research also lacks in determining what the causes and consequences of consistent cell phone use may be. The present study examined the prevalence of characteristics of a cell phone addiction among a university student population along with possible predictors of high frequency use. Participants were a total of 152 undergraduate students ($n = 35$ males and $n = 117$ females). It was hypothesized that anxiety, as measured using self-report questionnaires, would increase upon having access to one's cell phone limited for high frequency users. However, anxiety only increased when participants had their cell phone sitting in front of them and were instructed not to use them. Predictors and variables hypothesized to be related included social anxiety, social connectedness, and addiction-proneness. Results indicated that social anxiety and addiction-proneness are significant predictors of frequent cell phone use, but social connectedness has no significant connection. This study provided insights into why cell phones are sometimes used so compulsively, and if frequency of cell phone use is becoming so high that it is becoming a new behavioral addiction.

© 2015 Elsevier Ltd. All rights reserved.

1. Introduction

Cellular telephone use has become extremely widespread over the past several years, with approximately 8 million Canadians subscribing to wireless phone companies between 2007 and 2014 (Canadian Wireless Telecommunications Association, 2014). The rapid advancement in technology, now allowing fast and accessible communication, may be one of many factors influencing this growing use of cell phones. The amount and frequency of cell phone use has been called to attention in social and clinical research (Lepp, Li, Barkley, & Salehi-Esfahani, 2015; Tanis, Beukeboom, Hartmann, & Vermeulen, 2015). What has been of particular concern are the qualities of behavior demonstrated in cell phone users that fall in the same category of a behavioral addiction (Griffiths, 1996). Although research in cell phone use has not been greatly developed as it is a relatively new field, there have been a few hypotheses as to why cell phones may be so appealing. Cell phones provide immediate access to communication (Plant, 2000) as well as a less intimate method of interaction for those

experiencing social anxiety (Forgays, Hyman, & Schreiber, 2014; Lee, Chang, Lin, & Cheng, 2014; Reid & Reid, 2004). Essentially, it can be seen as an entire social network housed in one hand-held device.

As previous research has broadly discussed possible influencing factors that lead to high levels of cell phone use, the present study systematically tested for the prevalence of these factors, and whether they accurately predict high cell phone use which in turn may predict addictive behavioral qualities.

1.1. Prevalence and behaviors

Canada has accumulated approximately 28 million cell phone subscribers since 1985, and these statistics hold a steady trend of approximately 1 million additional users each year (Canadian Wireless Telecommunications Association, 2014). Although these numbers may provide an idea about the popularity of cell phones, it does not provide an estimate of how much these cell phones are used or what they are used for. Casual observation can note that cell phones are taken nearly everywhere by majority of the population who are old enough and competent enough to use them (Przybylski & Weinstein, 2013). Cell phones are now also more capable than simply making phone calls and sending text messages as majority of cell phones recently and currently being manufactured can now

* Corresponding author.

E-mail addresses: sapacz-m@webmail.uwinnipeg.ca (M. Sapacz), g.rockman@uwinnipeg.ca (G. Rockman), j.clark@uwinnipeg.ca (J. Clark).

send e-mails, access the internet, provide navigation systems, take pictures and videos, play music and movies, download video games, check social media, and many other functions. With all these functions available, preliminary research has discovered some of the more popular uses of cell phones in an attempt to answer a fundamental question; Why is cell phone use so prevalent?

The prevalence of text messaging has become so high that social etiquette related to cell phone use has been of concern (Forgays et al., 2014). An age effect persists as a small percentage (approximately 25%) of individuals younger than 50 years old believe ending a relationship through text messaging is appropriate, while no individuals over 50 years of age rated this behavior as appropriate (Forgays et al., 2014). This trend remains consistent as younger individuals regularly rate the possibility of no cell phone access as anxiety-provoking, the expectancy of a reply to be sooner, higher irritability when waiting for a response to a text message, and rate a higher range of social situations to be appropriate for text messaging (Forgays et al., 2014). An accumulation of these findings suggests a norm of more frequent and socially acceptable cell phone use in younger populations. These findings become more extreme when specifically studying users of smartphones (Lee, Chang, Lin, & Cheng, 2014).

Smartphones are a type of cell phone that allow users constant internet access (depending on their mobile data plan), which is primarily used for other forms of social interaction such as popular social media websites (i.e. Facebook, Instagram, Twitter) (Lee, Chang, Lin, & Cheng, 2014). These types of phones tend to lead to the most compulsive behavior that can have similar qualities to other behavioral addictions (Lee, Chang, Lin, & Cheng, 2014). Social etiquette with cell phones has increasingly become an issue as high-frequency users tend to have difficulties abstaining from glancing at their phone or interrupting a conversation to answer a text message (Bianchi & Phillips, 2005). Research testing various hypotheses as to why this type of obsession has become so prevalent is present, but scarce (Lee, Chang, Lin, & Cheng, 2014; Plant, 2000; Reid & Reid, 2004; Walsh, White, & Young, 2010).

Behaviors related to cell phone use have become such a concern that it has been compared to other behavioral addictions (Walsh et al., 2010). Although extreme amounts of cell phone use and signs of attachment have not been placed in the category of a pathological addiction, as it has not been determined if the negative consequences of cell phone use outweigh the benefits and if these consequences are debilitating, researchers have developed measurements of cell phone addiction based on pathological addictions (Walsh et al., 2010). Walsh, White and Young's (2010) Mobile Phone Involvement Questionnaire is based on Brown's (1993, 1997) eight components of a behavioral addiction; Salience – cognitive, salience – behavioral, conflict – interpersonal, conflict–other activities, relief/euphoria, loss of control/tolerance, and withdrawal. These researchers posit that if an individual self-rates high on these dimensions, they likely have some degree of a cell phone addiction.

1.2. Social anxiety

Social anxiety is described as a fear of social situations, resulting in avoidance of social situations or otherwise feelings of anxiety and stress when encountering the feared situations (American Psychiatric Association, 2013). It has been suggested that individuals who experience social anxiety tend to be more compulsive smartphone users (Lee, Chang, Lin, & Cheng, 2014). Communication through cell phones is a less intimate setting than face-to-face interactions, and this distance may decrease anxiety when communicating with others because it allows for more time and thought towards each reply in a conversation (Lee, Chang, Lin,

& Cheng, 2014). Conversations become even less intimate and therefore more comfortable when communicating through text messaging. Text messaging allows an escape of personal interactions in which one believes they are being constantly “evaluated or scrutinized” which can typically be felt in public settings, particularly by people who have social anxiety (Lee, Chang, Lin, & Cheng, 2014). Because of this feeling of judgment, individuals who have social anxiety prefer to text as a form of communication rather than make a phone call, which is a more personal type of contact (Reid & Reid, 2004). It also allows these individuals an opportunity to disclose their “real-self” which is more of a challenge in face-to-face conversations (Reid & Reid, 2004). In turn, this easily accessible option of communication may encourage individuals to avoid face-to-face conversations and therefore heighten their social anxiety as they decrease their experiences with intimate types of contact.

An additional reason cell phones may increase social anxiety is the nature of the object. Cell phones are typically kept in purses, personal bags, and pockets which are easily accessible. Individuals can take out their phone to become pre-occupied within the context of social situations to avoid direct communication with the people around them. Although this convenient escape from social situations could encourage the development of social anxiety for reasons previously mentioned, King et al. (2013) has suggested that cell phones may be facilitating for those with social anxiety as they use their cell phones to provide them with comfort and allow them to feel “safe and confident” in self-perceived overwhelming social situations. Simply, cell phones may reduce anxiety for those who have social anxiety.

While many studies have tested the relationship between social anxiety and cell phone use, results have yet to be exceedingly consistent as some find no relationship between the two variables (Harwood, Dooley, Scott, & Joiner, 2014) and some even find an inverse relationship (Lu et al., 2011). Lu et al. (2011) found that anxiety was negatively associated with text message dependency when controlling for depression. These researchers postulate that those high in text-message dependency (driving their cell phone addiction) find texting very central and important to their relationships. Thus, access to this constant communication via text messaging decreases anxiety related to social interaction. Lu et al. (2011) have also suggested the possibility of those low in anxiety being less fearful of rejection as defined by the absence of receiving a response to text messages. Therefore, there is less inhibition to communicate via text messages at a more frequent rate.

1.3. Social connectedness

Constant cell phone use can be a means of feeling social connectedness and togetherness, regardless of the prevalence of social anxieties. Cell phones have been found to be primarily used as a need for connection for young adults, but also used to validate approval from others (Walsh et al., 2010). Walsh et al. (2010) describe high frequency cell phone use as an explanation of the finding that cell phones assist in facilitating young adults' social life. This finding helps to explain why prevalence is especially high in young adults. In this stage of life, people tend to seek out reassurance and acceptance of their self-concept, and making friends and social connections can be a successful strategy.

With this view, cell phones would be a highly important object to young adults. Indeed, young adults seem to be the largest population in frequent cell phone use (Forgays et al., 2014; LaFrance, 2011), demonstrating attachment to the object through acts such as consistently sleeping besides their cell phones (LaFrance, 2011), texting or calling while driving, and experiencing some degree of “separation anxiety” when they are without their phone (Weller,

Shackelford, Dieckmann, & Slovic, 2013). It is possible that a degree of “separation anxiety” is present because the cell phone is perceived as more than a form of communication, but Plant (2000) suggests that they may provide a “continual sense of connection to the wider social world”, a feeling has been found to persist even when the phone is in silent mode (as cited in Przybylski & Weinstein, 2013). While providing a sense of comfort due to the feelings of social connectedness, this perception can act as a distraction that interferes with the quality of face-to-face conversation (Przybylski & Weinstein, 2013).

1.4. Present study

The present study examined characteristics of a cell phone addiction and how a cell phone addiction could be related to and influenced by a number of different variables. The main purpose of this study was to examine a few different circumstances in which an individual may experience anxiety upon having access to their cell phone revoked, presumably a characteristic of a behavioral addiction (Brown, 1993). Recently after this study was designed, Cheever, Rosen, Carrier, and Chavez (2014) published a similar study. This study measured anxiety after limiting participants' cell phone use. Although there are similarities in method, the present study offers new explanations and slightly different conditions with additional variables.

The present study hypothesized that an individual would experience an elevation of temporary anxiety when they had some degree of restricted access to their cell phone. As restrictions increase, levels of anxiety would increase. Specifically, anxiety should be higher when participants' cell phone is taken out of the room, in comparison to when the cell phone is put away (e.g., backpacks or purses), but still in participants' possession. Levels of anxiety are hypothesized to decrease even more so when participants are instructed to not use their cell phones but have them placed in front of them. All three scenarios should raise temporary levels of state anxiety more than a control condition where participants are free to use their phones whenever they please.

State anxiety is measured as per Brown's (1993, 1997) symptoms of withdrawal for a behavioral addiction, described as the occurrence of unpleasant emotion when the desired action (e.g., cell phone use) is limited. Based on Brown's (1993, 1997) and other literature discussing anxiety related to withdrawal in behavioral addictions such as gambling, (Błaszczynski, Walker, Sharpe, & Nower, 2008) the researchers chose anxiety as a variable to measure withdrawal, and ultimately a sign of addiction. Further, it was hypothesized that a condition when their phone was taken out of the room would provoke even higher levels of anxiety than conditions where their phone was still in their presence but they were unable to use it – i.e., they were exposed to less restriction. This anxiety would have presumably been influenced by higher levels of average daily cell phone use which in turn was hypothesized to have been influenced by higher levels of social anxiety. It was also hypothesized that higher levels of cell phone usage would be predicted by a high score of addiction proneness.

Based on Plant's (2000) suggestion that cell phones provide a “connection to a wider social world” (as cited in Przybylski & Weinstein, 2013), it was hypothesized that self-rated feelings of social connectedness would decline when participants were in a condition when their cell phones were taken out of the room. Again, this effect was predicted to be strongest in participants who rated high on mobile phone use. Those who use their cell phones for text messaging and phone calls at a high frequency, may find their phones to be “central to their life of interpersonal relationships” (Lu et al., 2011). Often, users seek rewards of social connectedness and social networking by constant communication

through cell phones (Lee et al., 2014). When this communication gets temporarily diminished because their phone has been taken out of their possession, these phone users may feel slightly isolated from the people they regularly connect with, hence their feelings of social connectedness may decrease. This effect may especially apply to those participants who do not know anyone else in the room the study is taking place in.

The present study also included a correlational part of research. Specifically, it was hypothesized that those who score high in social anxiety, as measured by The Self-Beliefs Related to Social Anxiety Scale (Wong & Moulds, 2011) would score high on mobile phone use. Similarly, those higher in addiction-prone personalities as measured by The Addiction-Prone Personality Scale (AP) (Barnes, Murray, Patton, Bentler, & Anderson, 2000) would have higher levels of mobile phone use.

Because research related to human interaction with technology and cell phones is a relatively new field of psychology, the present study sought out new information on how behaviors related to cell phone use could be classified as an addiction, as well as causes (i.e. – addiction proneness, social anxiety) and effects (i.e. – increased anxiety) of frequent use.

2. Method

2.1. Participants

Participants were 152 undergraduate university students enrolled in Introductory Psychology classes at the University of Winnipeg in Manitoba, Canada. All participants voluntarily signed up using the SONA system on the Introductory Psychology Research Requirement Nexus website in exchange for one research credit. Of the sample, 23% were male ($n = 35$) and 77% were female ($n = 117$). Eighty-five percent of participants ($n = 130$) were between the ages 18 and 24.

2.2. Materials

Participants received a stapled booklet containing the following five self-report questionnaires. This booklet was administered after a brief waiting period (see section 2.3 Procedure).

2.2.1. The state-trait anxiety inventory for adults

The State-trait Anxiety Inventory for Adults (STAI) (Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1977) is a 40-item questionnaire that consists of 20 questions measuring levels of anxiety participants feel at the given moment (State anxiety – SA) and 20 questions measuring the levels of anxiety participants generally feel (trait anxiety – TA). Each question is answered using a 4-point Likert scale. The STAI is a widely used scale with excellent reliability and validity (Grös, Antony, Simms, & McCabe, 2007).

2.2.2. The social connectedness scale

The Social Connectedness Scale- Revised (SOCCON) (Lee, Draper, & Lee, 2001) is a 20-question scale that measures social connectedness as a trait-like, subjective sense of closeness and belonging. This scale uses a 6-point Likert scale. Validity and reliability have been found to score high on this scale (Yoon, Jung, Lee, & Felix-Mora, 2012).

2.2.3. The self-beliefs related to social anxiety scale

The Self-Beliefs Related to Social Anxiety Scale (SANX) (Wong & Moulds, 2011) is a 15-item questionnaire that taps into high standards of social performance, beliefs about social evaluation, and beliefs about the self. This self-report scale allows respondents to reply by using a 11-point Likert scale. Validation studies have

confirmed high internal consistency, strong test-retest reliability, and high convergent, divergent, incremental, and discriminative validity (Wong, Moulds, & Rapee, 2014).

2.2.4. The addiction-prone personality scale

The Addiction-Prone Personality Scale (AP) (Barnes et al., 2000) measures levels of addiction proneness by assessing personality traits that are related to increased risk of developing addictive disorders on a 21-item, yes-or-no questionnaire. This scale has been deemed “adequate” on internal consistency, test-retest reliability, and construct validity (Anderson, Barnes, & Murray, 2011).

2.2.5. The mobile phone problem use scale

The Mobile Phone Problem Use Scale (MPU) (Bianchi & Phillips, 2005) is a 27-item questionnaire that assesses mobile phone use as a behavioral addiction. The self-report measurement includes addictive symptoms such as tolerance, escape from other problems, withdrawal, craving, and negative life consequences. This 10-point Likert scale has been widely used in assessing mobile phone use, especially in adolescents (Foerster, Roser, Schoeni, & Rösli, 2015; Lopez-Fernandez, Honrubia-Serrano, Freixa-Blanchart, & Gibson, 2014).

2.3. Procedure

In each condition, participants were given a consent form upon arrival. Once all consent forms were signed and collected, participants were given instructions about what to do with their cell phones. These instructions varied dependent upon condition.

Participants were randomly assigned to one of four conditions based on the date and time of the session they chose to sign up for. In the “Taken Away” condition, participants’ cell phones were put in a plastic bag with their name on it, and collectively placed inside a box. Participants were told the reasoning for this was to eliminate all possible distractions. The box was then taken out of the room by an assistant. In the “Salient” condition, participants were asked to take their cell phones out and put them on the tables in front of them. They were instructed not to use them and told their phones were to be taken out so that the experimenter could make sure they were not using them. In the “Hidden” condition, participants were asked not to use their cell phones and to put them away either in their pockets or backpacks. In the control condition, participants were not given any instruction regarding use of their cell phones.

The three experimental conditions were put in place to determine if anxiety were to increase upon limiting participants’ access to their cell phone as hypothesized, what the specific cause of this anxiety would be. The “Taken Away” condition allows for determining if proximal distance is the driving cause of anxiety. The “Salient” and “Hidden” conditions allow researchers to discriminate between anxiety caused by not having the cell phone in sight and anxiety caused by not being able to use the cell phone.

While preparing to administer the questionnaires, the experimenter pretended to have forgotten the debriefing forms and left the room for approximately 3–5 min. While the experimenter was gone, the participants experienced a waiting period that was presumed to be a situation where they would normally use their cell phones to pass the time. It was hypothesized that this waiting period would be the main cause for an increase in anxiety. In the Salient and Hidden conditions, an assistant was in the room while the experimenter left to ensure participants did not use their phones during these few minutes.

Upon the experimenter’s return, the questionnaires were administered. When all participants were finished filling out the questionnaires, they were debriefed and provided contact information.

3. Results

Descriptive statistics and Cronbach’s alpha values for all initial measures are shown in Table 1. Each questionnaire had relatively high Cronbach alphas except for the Addiction-Prone personality scale. This was possibly because of the yes or no question format of the scale.

3.1. State anxiety and social connectedness

Analysis of variance demonstrated that state anxiety (SA) varied as a function of experimental condition, $F(3, 148) = 3.628, p = 0.015, \eta^2 = 0.069$. As shown in Fig. 1, SA significantly increased in the “Salient” condition relative to the other three conditions. However, there were no significant differences between “Taken Away,” “Hidden,” and “Use” conditions. This was confirmed by a post hoc analysis. Specifically, LSD tests were conducted on all possible pairwise contrasts for SA on each condition. The “Salient” condition ($M = 2.637, SD = 0.262$) was significantly higher than the “Use (Control)” condition ($M = 2.455, SD = 0.245$), as expected. The “Salient” condition was also significantly higher for the “Hidden” condition ($M = 2.492, SD = 0.276$) and the “Taken Away” condition ($M = 2.505, SD = 0.246$). Although it was predicted that the experimental conditions would result in an increase of SA, it was not expected that the highest levels of SA would derive from the “Salient” condition. Possible reasons for this are presented in the discussions section.

Regression analyses were run to determine if high levels of mobile phone use predicted elevated levels of temporary anxiety within the experimental conditions. Mobile Phone Problem Use (MPU) did not significantly predict SA in any of the three experimental conditions: $\beta = -0.010, t = -0.200, p = 0.842$ for the “Taken Away” condition; $\beta = -0.025, t = -0.521, p = 0.606$ for the “Salient” condition; and $\beta = -0.045, t = -0.668, p = 0.509$ “Hidden” condition. These results did not meet the predicted expectations that suggested mobile phone use would significantly predict SA in the experimental conditions.

Fig. 2 demonstrates the mean level of Social Connectedness (SOCCON) for each condition. There were no significant differences on SOCCON between the four conditions, $F(3, 148) = 0.859, p = 0.464$. These results failed to support the hypotheses about social connectedness.

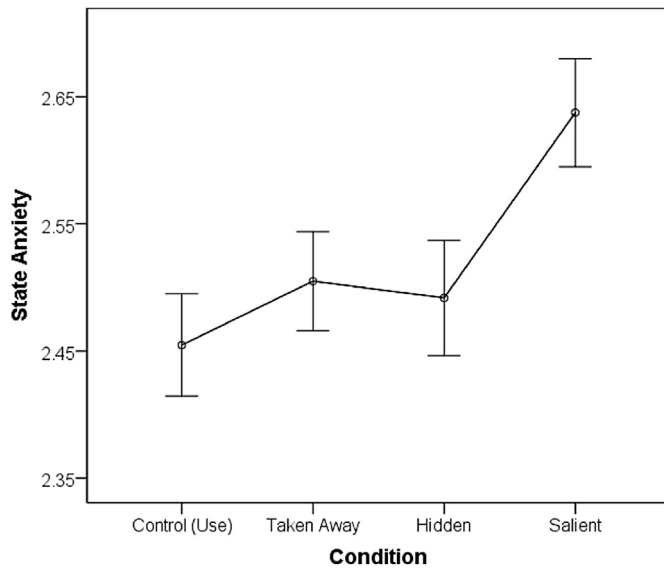
3.2. Predictors of cell phone use

Given the predictors of mobile problem use were obtained after the treatment condition and to examine their relationships uncontaminated by condition, a multiple regression analysis was run. The dependent variable was MPU and the predictors were AP, SANX, and three dummy variables representing experimental condition. The overall regression was significant, $F(5, 145) = 5.80$,

Table 1
Descriptive statistics and reliabilities for all measures.

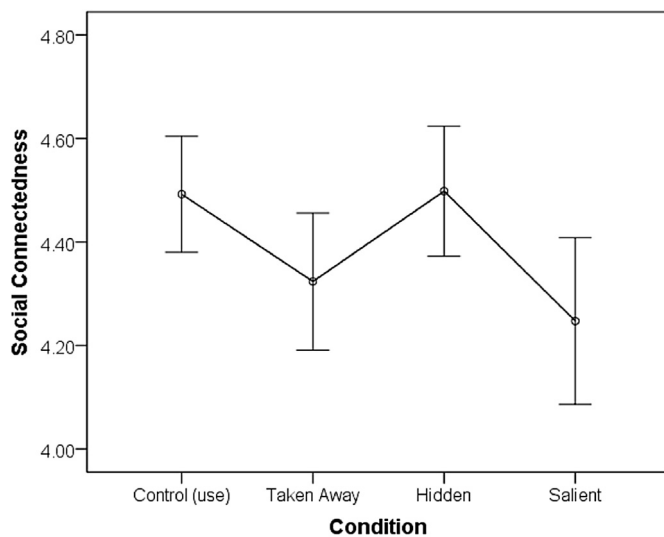
Variable	<i>M</i>	<i>SD</i>	Cronbach’s alpha (α)
SA	2.52	0.264	0.708
TA	2.23	0.506	0.784
SOCCON	4.42	0.828	0.931
SANX	3.37	1.928	0.935
AP	0.45	0.142	0.594
MPU	4.01	1.370	0.909

Note. $n = 152$. SA = State Anxiety, TA = Trait Anxiety, SOCCON = Social Connectedness, SANX = Social Anxiety, AP = Addiction-Prone Personality, MPU = Mobile Phone Problem Use.



Note. $F(3,148) = 3.628, p = 0.015$.

Fig. 1. State anxiety as a function of condition.



Note. $F(3,148) = 0.859, p = 0.464$

Fig. 2. Social connectedness as a function of condition.

$p < 0.001, R^2 = 0.167$. However, the only significant predictors were AP, $\beta = 0.268, p = 0.001$, and SANX, $\beta = 0.234, p = 0.004$. None of the dummy variables for condition even approached significance, $ps > 0.39$. These analyses confirmed that the hypothesized predictors (Social Anxiety and Addiction Proneness) were significantly related to cell phone use.

Of course, there are an abundance of variables contributing to problematic cell phone use, which may explain why addiction-proneness and social anxiety can only account for limited, although highly significant, amounts of variability. For example, depression has been associated with high levels of cell phone use (Lu et al., 2011), as well as the intention of phone use (Roberts, PetnjiYaya, & Manolis, 2014). Naturally, a common activity such as cell phone use can have many more influencing factors on how often one uses, such as how often friends and family use their

phones, personality type, or socioeconomic status.

4. Discussion

The hypothesized relations were that social anxiety and addiction proneness would predict high levels of phone use and in turn, those with high levels of phone use would demonstrate higher levels of state anxiety in experimental conditions of the study, as a symptom of withdrawal from the behavioral addiction of cell phone use.

4.1. Predictors of cell phone use

Social anxiety and addiction proneness significantly predicted cell phone use, as hypothesized. Although this is not the first study that has examined the relationship between social anxiety and cell phone use, research focusing on this relationship is relatively new, especially in Western cultures. In a sense, examining this relationship was a replication, increasing reliability of previous findings indicating the relationship between social anxiety and cell phone use. On the other hand, research has yet to compare addiction proneness levels to cell phone use levels, a relationship that was concluded to be significant.

Results supported hypotheses that addiction proneness would predict higher levels of mobile phone use. This is the first study to ever examine addiction proneness as a predictor of mobile phone use. These findings may suggest a new view of high level cell phone use as a behavioral addiction rather than simply a frequent and trending behavior. It may also provide insights to the nature of behaviors that people with addiction-prone personalities partake in. Future studies may look into whether obsessive cell phone users have other addictive habits to further validate this relationship.

Although it has been previous speculated that higher levels of social anxiety lead to higher mobile phone use (Lee, Chang, Lin, & Cheng, 2014), to our knowledge this has yet to be experimentally tested. The current study predicted that social anxiety would lead to higher levels of mobile phone use which would in turn lead to high levels of anxiety when cell phone use was restricted throughout the experiment. Although these findings were statistically demonstrated, these ordering of events could not be concluded due to the nature of the experiment. Therefore, it is possible that the direction is reversed when examining social anxiety and mobile phone use. Until it is systematically tested, it cannot be rejected that high levels of mobile phone use lead to an increase in social anxiety. Perhaps cell phone users become so used to communicating via text messaging or phone conversations rather than face-to-face conversations that they become more comfortable with the social distance and begin to develop mild levels of social anxiety. This speculation suggests ideas for future research.

4.2. Prevalence and behaviors

Results from the present study supported the general hypothesis that state anxiety (SA) would increase when participants had restricted access to their cell phones, which is presumed to be a sign of a cell phone addiction, as previously mentioned. However, the condition, "Taken Away," which was predicted to lead to the highest levels of SA failed to meet expectations. Rather, the "Salient" condition was the only experimental condition to lead to the highest levels of SA among participants. It is possible that anxiety increased significantly in the "Salient" condition because of how obvious it was that they could not use their phones (i.e., it was sitting right in front of them). This finding highlights future ways to do research, such as adding more conditions to determine the drive

of anxiety. Another possibility is to use different objects in the salient condition to determine if anxiety increased because it was clear to the participants that they were not allowed to use an object that was directly in front of them.

The “Taken Away” condition did not include a noticeable reminder that participants could not use their phones, as their phones were taken out of the room. Therefore, it cannot be concluded with absolute confidence that anxiety increased because participants were addicted to their phones and were unable to use them. If this were the case, it would be expected that all three experimental conditions would result in significantly higher levels of anxiety compared to the control condition. It would also be expected that high levels of mobile phone use would predict high levels of SA, which was also not the case.

Cheever et al. (2014) demonstrated contradicting results as participants had increased anxiety in a similar “Taken Away” condition. One possibility for the differences in results could be the duration of the period the participants were unable to use their phone (1 h vs 5 min), as 5 min may have not been a long enough period of time for participants to feel anxiety. One feature the present study included was the addition of the “Salient” and “Control” condition. These conditions allowed researchers to determine which specific aspect was driving the increase in anxiety (the inability to see their phones, the inability to have their phones in their possession, or the inability to use their phones). The control condition allowed for a direct comparison of normal behavior participants’ may exhibit with their cell phones. Future research may consider increasing the strength of both these studies by combining design features such as duration of time participants’ phones were taken away with the additional conditions.

Due to the gender ratio in the sample population derived from the University of Winnipeg, there were more females than males in this study. It is possible that this difference could influence results although there are inconsistencies among previous studies reporting about gender differences in cell phone use (Johansson & Götestam, 2004; Lu et al., 2011) and social anxiety (La Greca, Ingles, Lai, & Marzo, 2015; Inderbitzen-Nolan & Walters, 2000). However, females tend to have higher levels of social connectedness (Ang, 2015), although this portion of the study presented as insignificant. Replication of the present study with an even gender ratio could further verify the impact of gender.

4.3. Social connectedness

Social connectedness was analyzed based on Plant’s (2000) theoretical discussion about how cell phones seem to “provide a continual sense of connection to a wider social world” (as cited in Przybylski & Weinstein, 2013). Interviews and observations have provided some evidence suggesting that this may likely be a plausible theory about why cell phones are so appealing (Przybylski & Weinstein, 2013), but directly testing levels of social connectedness in relation to cell phone proximity have yet to be implemented in psychological experiments.

Results demonstrated that social connectedness did not vary as a function of cell phone restriction. As speculated why SA did not increase in certain experimental conditions, it is possible that the reasoning applies to this variable as well. The waiting period in the experiment may simply not have been long enough to be able to significantly alter feelings, moods, or states of mind. Social connectedness may be a more stable feeling that takes more than a 3-min waiting period to be able to alter significantly. Social connectedness may have also been present in the type of setting which the study was conducted. Although most participants did not seem to know anyone in the room during the study, they may have felt a sense of connection from the nature of why these people

were grouped together; They were all taking introduction to Psychology at the University of Winnipeg and were simultaneously doing the same task, possibly providing a slight sense of cohesion. Future studies may test feelings of social connectedness when participants are alone rather than in groups, while manipulating the presence of their cell phones.

As the idea about a relationship between social connectedness and cell phones is a relatively new hypothesis, it is possible that it is an incorrect suggestion or perhaps too simplified. Plant (2000) has suggested that the feeling of social connectedness continues to persist when the cell phone is in “off” mode (as cited in Przybylski & Weinstein, 2013). It has also been found that the mere presence of a cell phone, even when it does not belong to anybody who is in the room at the time, can negatively affect face-to-face interactions when meeting a new person by decreasing the quality of conversation (Przybylski & Weinstein, 2013). This distraction could possibly be related to some aspect of social connectedness. Perhaps the person who is distracted by the cell phone is preoccupied thinking about their own social connections and loses interest in meeting someone new. The idea of a cell phone may be merely symbolic and reminds the owner of the social connections they have kept because of the ability to stay in constant communication via cell phone. When the cell phones were taken away in this study, it was not a strong enough manipulation to decrease participants’ feelings of social connectedness because they knew their cell phones were still within close distance (i.e., within the building) and were safe. Perhaps it is a much more complicated theory than either of these suggestions.

5. Conclusions

The present study aimed to answer the question of whether a sample of the current population is addicted to their cell phones, while also examining predictors of cell phone use and its relation to social connectedness. State anxiety was used as a measure of withdrawal which is a component of a behavioral addiction. State anxiety only increased when participants had their cell phones in front of them and were instructed not to use them. This may suggest that some attachment to cell phones is present, but these results would be considered a preliminary finding. Addiction proneness and social anxiety significantly predicted high cell phone use, as expected. No significant link was found between social connectedness and cell phone use. Future studies will provide more certainty about whether cell phone addiction is an increasing behavior by analyzing more behaviors that are related to behavioral addictions.

References

- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders: DSM-5*. Washington, D.C: American Psychiatric Association.
- Anderson, R. E., Barnes, G. E., & Murray, R. P. (2011). Psychometric properties and long-term predictive validity of the addiction-prone personality (APP) scale. *Personality and Individual Differences*, 50(5), 651–656. <http://dx.doi.org/10.1016/j.paid.2010.12.011>.
- Ang, C. (2015). Types of social connectedness and loneliness: the joint moderating effects of age and gender. *Applied Research in Quality of Life*. <http://dx.doi.org/10.1007/s11482-015-9428-5>.
- Barnes, G. E., Murray, R. P., Patton, D., Bentler, P. M., & Anderson, R. E. (2000). *The addiction-prone personality*. Dordrecht, Netherlands: Kluwer Academic Publishers.
- Bianchi, A., & Phillips, J. G. (2005). Psychological predictors of problem mobile phone use. *Cyberpsychology & Behavior*, 8(1), 39–51. <http://dx.doi.org/10.1089/cpb.2005.8.39>.
- Blaszczynski, A., Walker, M., Sharpe, L., & Nower, L. (2008). Withdrawal and tolerance phenomenon in problem gambling. *International Gambling Studies*, 8(2), 179–192. <http://dx.doi.org/10.1080/14459790802140007>.
- Brown, R. I. F. (1993). *Some contributions of the study of gambling to the study of other addictions. Gambling behavior and problem Gambling*. Nevada: Institute for the Study of Gambling and Commercial Gaming.

- Brown, R. I. F. (1997). *A theoretical model of the behavioral addictions — Applied to offending. Addicted to crime*. Chichester: John Wiley.
- Canadian Wireless Telecommunications Association. (2014). *Facts & figures: Wireless phone subscribers in Canada* [Data file]. Retrieved from <http://cwta.ca/facts-figures/>.
- Cheever, N. A., Rosen, L. D., Carrier, L. M., & Chavez, A. (2014). Out of sight is not out of mind: the impact of restricting wireless mobile device use on anxiety levels among low, moderate and high users. *Computers in Human Behavior*, 37, 290–297. <http://dx.doi.org/10.1016/j.chb.2014.05.00>.
- Foerster, M., Roser, K., Schoeni, A., & Rössli, M. (2015). Problematic mobile phone use in adolescents: derivation of a short scale MPPUS-10. *International Journal of Public Health*, 60(2), 277–286. <http://dx.doi.org/10.1007/s00038-015-0660-4>.
- Forgays, D., Hyman, I., & Schreiber, J. (2014). Texting everywhere for everything: gender and age differences in cell phone etiquette and use. *Computers in Human Behavior*, 31, 314–321. <http://dx.doi.org/10.1016/j.chb.2013.10.053>.
- Griffiths, M. D. (1996). Gambling on the internet: a brief note. *Journal of Gambling Studies*, 12, 471–473.
- Grös, D. F., Antony, M. M., Simms, L. J., & McCabe, R. E. (2007). Psychometric properties of the state-trait inventory for cognitive and somatic anxiety (STICSA): comparison to the state-trait anxiety inventory (STAI). *Psychological Assessment*, 19(4), 369–381. <http://dx.doi.org/10.1037/1040-3590.19.4.36>.
- Harwood, J., Dooley, J. J., Scott, A. J., & Joiner, R. (2014). Constantly connected—The effects of smart-devices on mental health. *Computers in Human Behavior*, 34, 267–272. <http://dx.doi.org/10.1016/j.chb.2014.02.006>.
- Inderbitzen-Nolan, H. M., & Walters, K. S. (2000). Social anxiety scale for Adolescents: normative data and further evidence of construct validity. *Journal of Clinical Child Psychology*, 29(3), 360–371. http://dx.doi.org/10.1207/S15374424JCCP2903_7.
- Johansson, A., & Götestam, K. G. (2004). Internet addiction: characteristics of a questionnaire and prevalence in Norwegian youth (12–18 years). *Scandinavian Journal of Psychology*, 45(3), 223–229. <http://dx.doi.org/10.1111/j.1467-9450.2004.00398.x>.
- King, A. S., Valença, A. M., Silva, A. O., Baczynski, T., Carvalho, M. R., & Nardi, A. E. (2013). Nomophobia: dependency on virtual environments or social phobia? *Computers in Human Behavior*, 29(1), 140–144. <http://dx.doi.org/10.1016/j.chb.2012.07.025>.
- La Greca, A. M., Ingles, C. J., Lai, B. S., & Marzo, J. C. (2015). Social anxiety scale for adolescents: factorial invariance across gender and age in Hispanic American adolescents. *Assessment*, 22(2), 224–232. <http://dx.doi.org/10.1177/1073191114540749>.
- LaFrance, M. (2011). We, lonely robots. *Psychocritiques*, 56(51). <http://dx.doi.org/10.1037/a0026395>.
- Lee, Y., Chang, C., Lin, Y., & Cheng, Z. (2014). The dark side of smartphone usage: psychological traits, compulsive behavior and technostress. *Computers in Human Behavior*, 31, 373–383. <http://dx.doi.org/10.1016/j.chb.2013.10.047>.
- Lee, R. M., Draper, M., & Lee, S. (2015). Social connectedness, dysfunctional interpersonal behaviors, and psychological distress: Testing a mediator model. *Journal Of Counseling Psychology*, 48(3), 310–318. <http://dx.doi.org/10.1037/0022-0167.48.3.310>.
- Lepp, A., Li, J., Barkley, J. E., & Salehi-Esfahani, S. (2015). Exploring the relationships between college students' cell phone use, personality and leisure. *Computers in Human Behavior*, 43, 210–219. <http://dx.doi.org/10.1016/j.chb.2014.11.006>.
- Lopez-Fernandez, O., Honrubia-Serrano, L., Freixa-Blanxart, M., & Gibson, W. (2014). Prevalence of problematic mobile phone use in British adolescents. *Cyberpsychology, Behavior, and Social Networking*, 17(2), 91–98. <http://dx.doi.org/10.1089/cyber.2012.0260>.
- Lu, X., Watanabe, J., Liu, Q., Uji, M., Shono, M., & Kitamura, T. (2011). Internet and mobile phone text-messaging dependency: factor structure and correlation with dysphoric mood among Japanese adults. *Computers in Human Behavior*, 27(5), 1702–1709. <http://dx.doi.org/10.1016/j.chb.2011.02.00>.
- Plant, S. (2000). *On the mobile: The effects of mobile telephones on social and individual life*. California: Motorola.
- Przybylski, A. K., & Weinstein, N. (2013). Can you connect with me now? how the presence of mobile communication technology influences face-to-face conversation quality. *Journal of Social and Personal Relationships*, 30(3), 237–246.
- Reid, D., & Reid, F. (2004). *Insights into the social and psychological effects of SMS text messaging*. Retrieved from <http://courses.educ.ubc.ca/etec540/May08/suz/assess/SocialEffectsOfTextMessaging.pdf>.
- Roberts, J. A., Petnji Yaya, L. H., & Manolis, C. (2014). The invisible addiction: cell-phone activities and addiction among male and female college students. *Journal of Behavioral Addictions*, 3(4), 254–265. <http://dx.doi.org/10.1556/JBA.3.2014.015>.
- Spielberger, C. D., Gorsuch, R. L., Lushene, P. R., Vagg, P. R., & Jacobs, G. A. (1977). *State-trait anxiety inventory for adult*. Redwood City, CA: Mind Garden.
- Tanis, M., Beukeboom, C. J., Hartmann, T., & Vermeulen, I. E. (2015). Phantom phone signals: an investigation into the prevalence and predictors of imagined cell phone signals. *Computers in Human Behavior*, 51(Pt A), 356–362. <http://dx.doi.org/10.1016/j.chb.2015.04.039>.
- Walsh, S. P., White, K., & Young, R. (2010). Needing to connect: the effect of self and others on young people's involvement with their mobile phones. *Australian Journal of Psychology*, 62(4), 194–203. <http://dx.doi.org/10.1080/00049530903567229>.
- Weller, J. A., Shackelford, C., Dieckmann, N., & Slovic, P. (2013). Possession attachment predicts cell phone use while driving. *Health Psychology*, 32(4), 379–387. <http://dx.doi.org/10.1037/a0029265>.
- Wong, Q. J. J., & Moulds, M. L. (2011). A new measure of the maladaptive self-beliefs in social anxiety: psychometric properties in a non-clinical sample. *Journal of Psychopathology and Behavioral Assessment*, 33, 273–284.
- Wong, Q. J., Moulds, M. L., & Rapee, R. M. (2014). Validation of the self-beliefs related to social anxiety scale: a replication and extension. *Assessment*, 21(3), 300–311. <http://dx.doi.org/10.1177/1073191113485120>.
- Yoon, E., Jung, K. R., Lee, R. M., & Felix-Mora, M. (2012). Validation of social connectedness in mainstream society and the ethnic community scales. *Cultural Diversity and Ethnic Minority Psychology*, 18(1), 64–73. <http://dx.doi.org/10.1037/a0026600>.